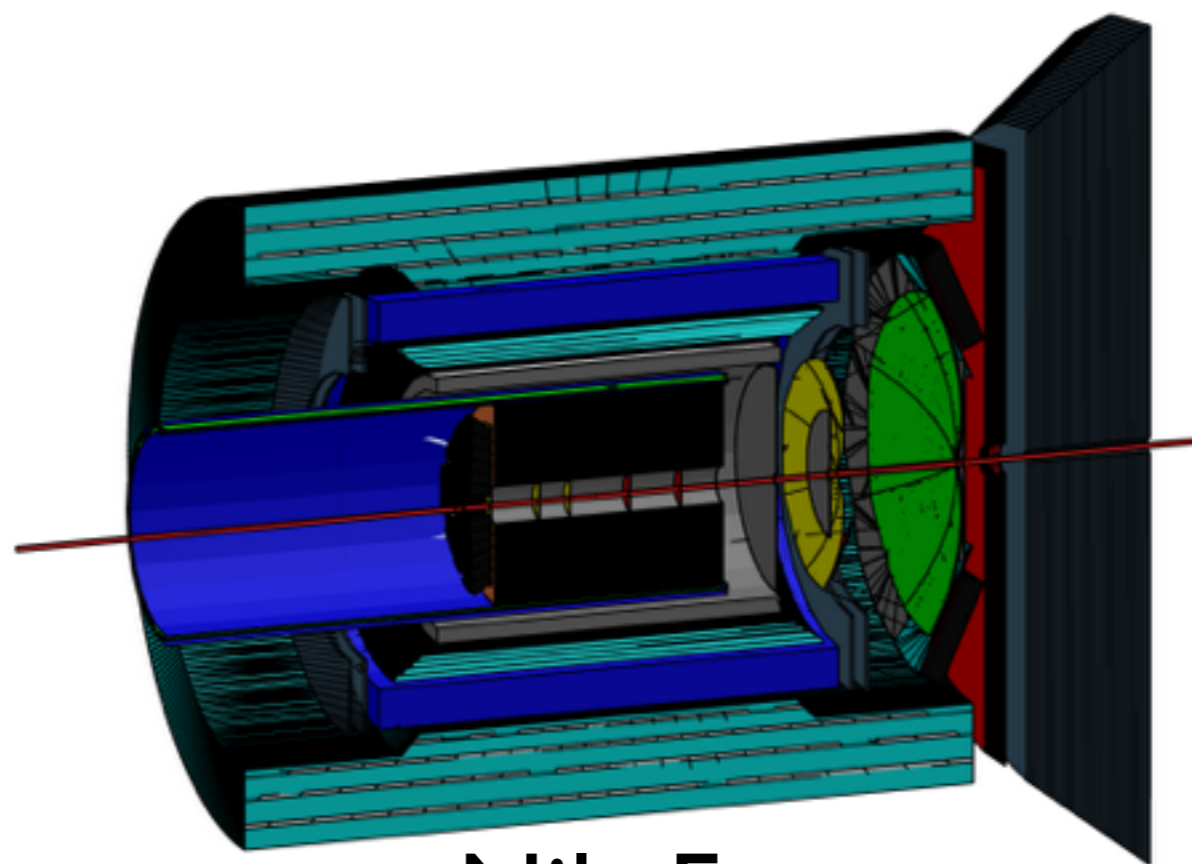




Stony Brook University

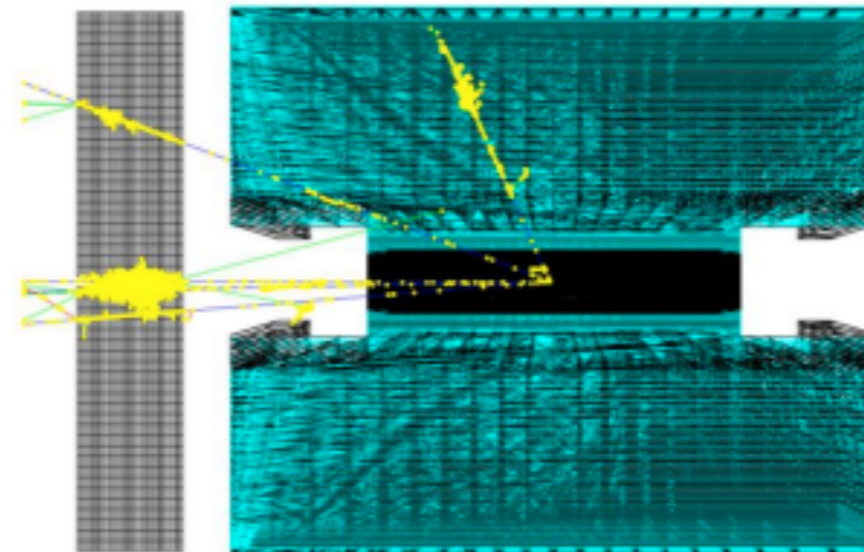
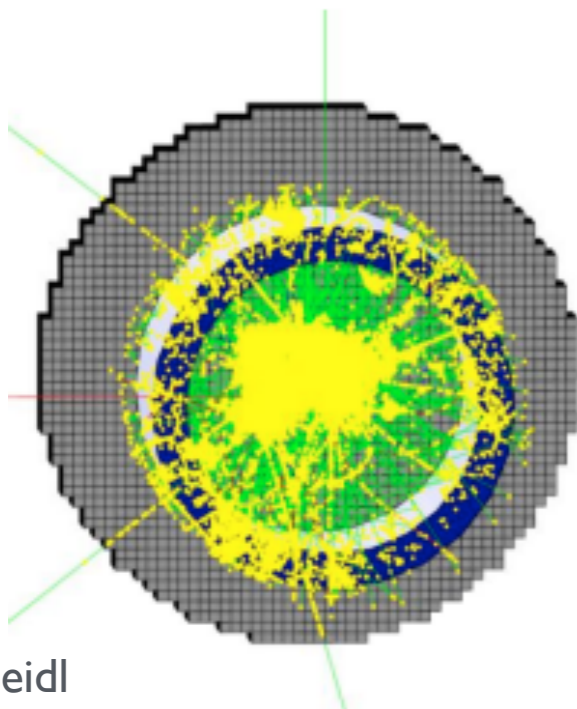
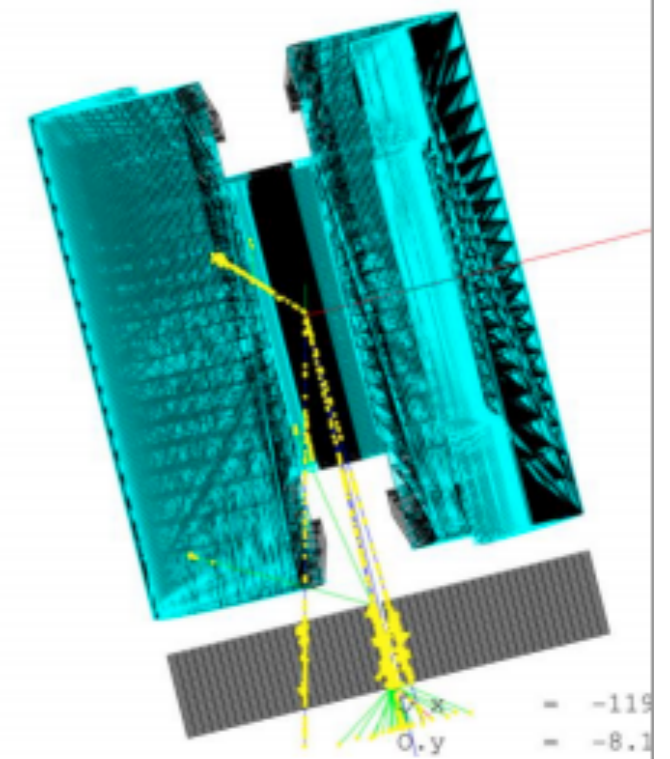
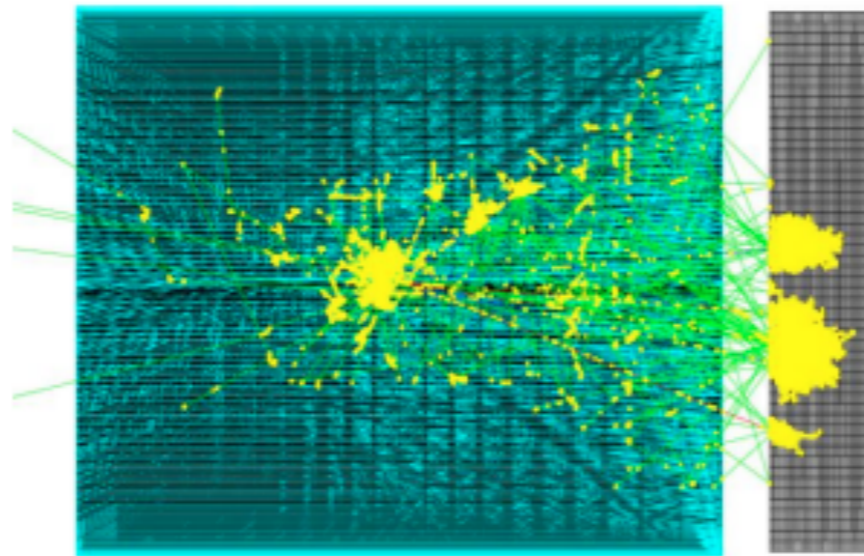
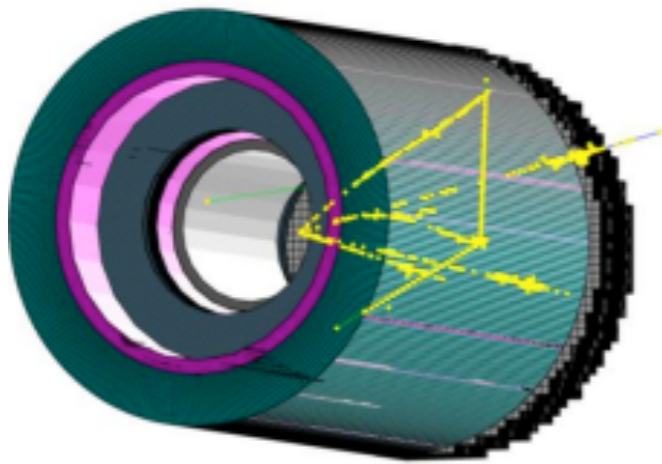
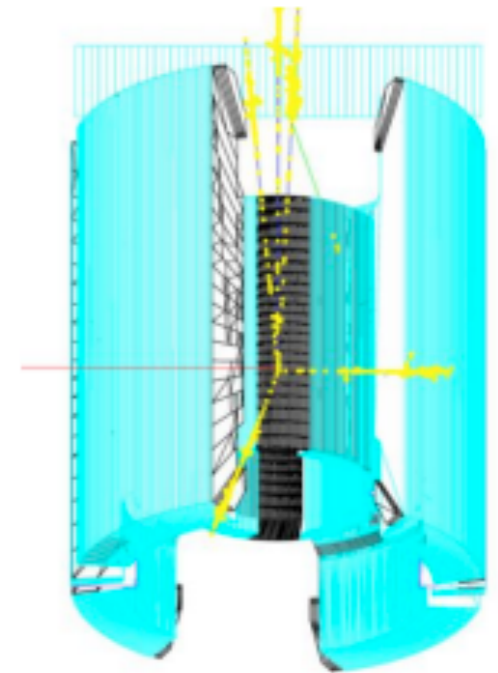
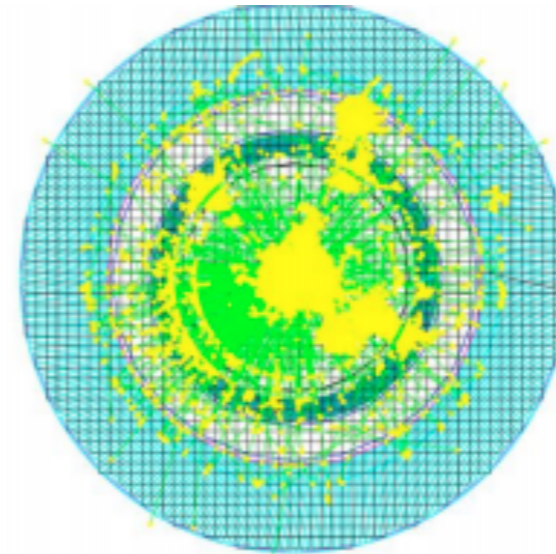
Updates Forward Calorimeter



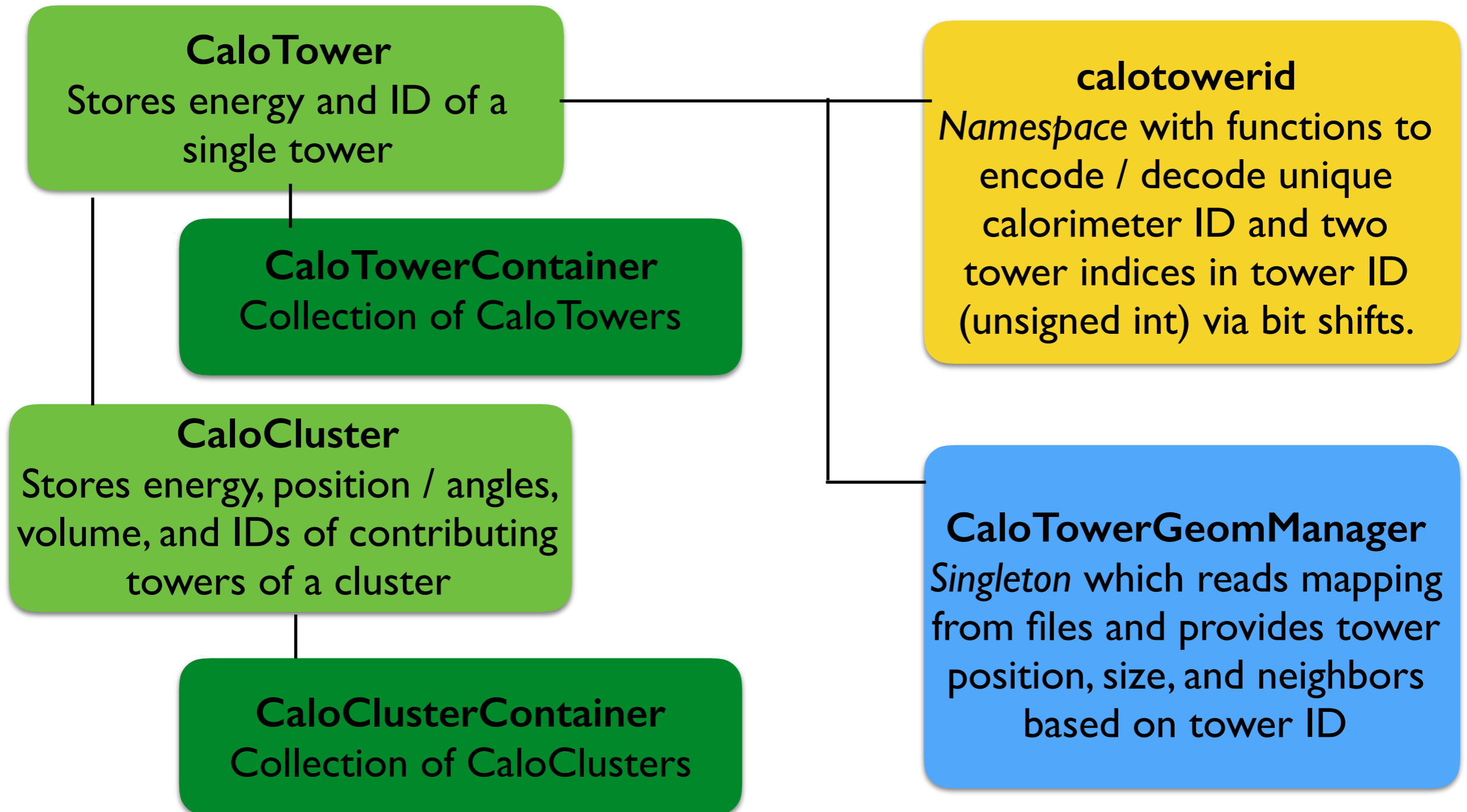
Nils Feege

Joint fsPhenix / EIC Detector Simulation Meeting
October 20 2015

Some FHCAL event displays



New calorimeter objects



GitHub (sPhenix): CaloTower Branch



The screenshot shows the GitHub interface for the repository `sPHENIX-Collaboration / coresoftware`. The `CaloTower` branch is selected and highlighted with a green box. The breadcrumb navigation shows `coresoftware / simulation / g4simulation / +`. A status bar indicates the branch is 45 commits ahead and 80 commits behind master. Recent commits are listed, including one by `nfeege` titled "Fix bug in Enum use" with the latest commit hash `db7a05f` from 10 days ago. A folder named `g4cemc` is also shown with the same commit message and date.

Branch: **CaloTower** ▾ `coresoftware / simulation / g4simulation / +`

This branch is 45 commits ahead, 80 commits behind master. [Pull request](#) [Compare](#)

nfeege Fix bug in Enum use Latest commit `db7a05f` 10 days ago

..

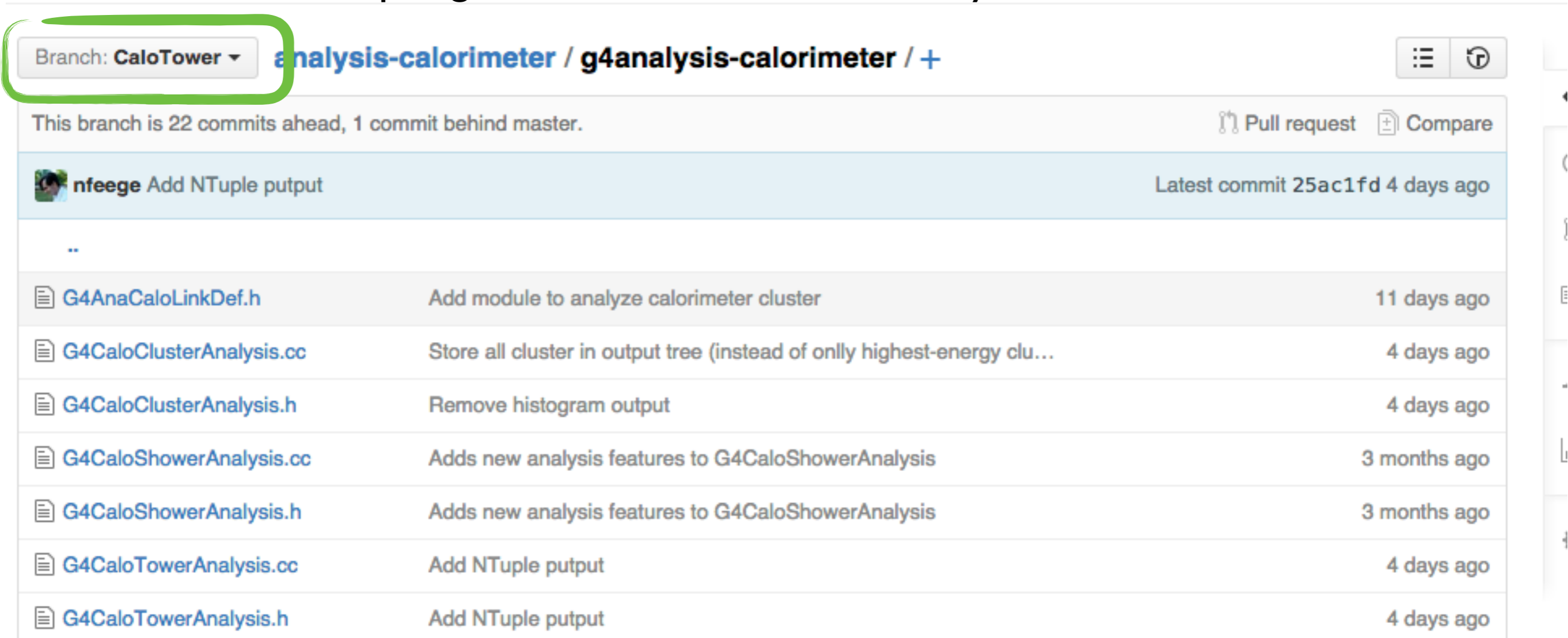
g4cemc Fix bug in Enum use 10 days ago

<https://github.com/sPHENIX-Collaboration/coresoftware>

- To use new CaloTower and CaloCluster (which work for forward calorimeter):
- Check out CaloTower branch of this repository
 - Compile the g4cemc library and add it to your `LD_LIBRARY_PATH`


GitHub (EIC): CaloTower Branch

<https://github.com/EIC-Detector/analysis-calorimeter>










Branch: **CaloTower** ▾ analysis-calorimeter / g4analysis-calorimeter / +

This branch is 22 commits ahead, 1 commit behind master. [Pull request](#) [Compare](#)

 **nfeege** Add NTuple output Latest commit 25ac1fd 4 days ago

..

 G4AnaCaloLinkDef.h	Add module to analyze calorimeter cluster	11 days ago
 G4CaloClusterAnalysis.cc	Store all cluster in output tree (instead of onlly highest-energy clu...	4 days ago
 G4CaloClusterAnalysis.h	Remove histogram output	4 days ago
 G4CaloShowerAnalysis.cc	Adds new analysis features to G4CaloShowerAnalysis	3 months ago
 G4CaloShowerAnalysis.h	Adds new analysis features to G4CaloShowerAnalysis	3 months ago
 G4CaloTowerAnalysis.cc	Add NTuple output	4 days ago
 G4CaloTowerAnalysis.h	Add NTuple output	4 days ago

- Compile this library and make sure you link against your version of g4cenc library based on CaloTower branch

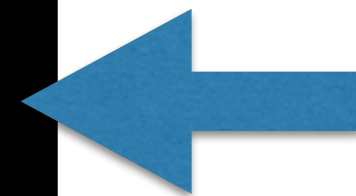
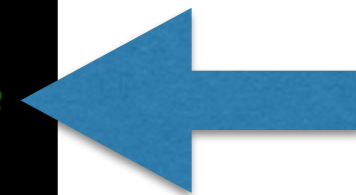
Compiling g4analysis-calorimeter

- After you run autogen.sh, you'll need to add two lines to the Makefile to tell it where to find the header files from your CaloTower branch version of g4cenc (What's a better solution for this?)

```
top_builddir = .
top_srcdir = ../../analysis-calorimeter/g4analysis-calorimeter
AUTOMAKE_OPTIONS = foreign
INCLUDES = \
  -I$(includedir) \
  -isystem $(OFFLINE_MAIN)/include/eigen3 \
  -isystem $(OFFLINE_MAIN)/include \
  -isystem $(G4_MAIN)/include \
  -isystem $(ROOTSYS)/include \
  -isystem /direct/phenix+u/nfeege/sphenixsw/devel/install/g4cenc/include

RINCLUDES = \
  -I$(includedir) \
  -I$(OFFLINE_MAIN)/include/eigen3 \
  -I$(OFFLINE_MAIN)/include \
  -I$(G4_MAIN)/include \
  -I$(ROOTSYS)/include \
  -I/direct/phenix+u/nfeege/sphenixsw/devel/install/g4cenc/include

AM_LDFLAGS = \
  -L$(libdir) \
  -L$(OFFLINE_MAIN)/lib
```



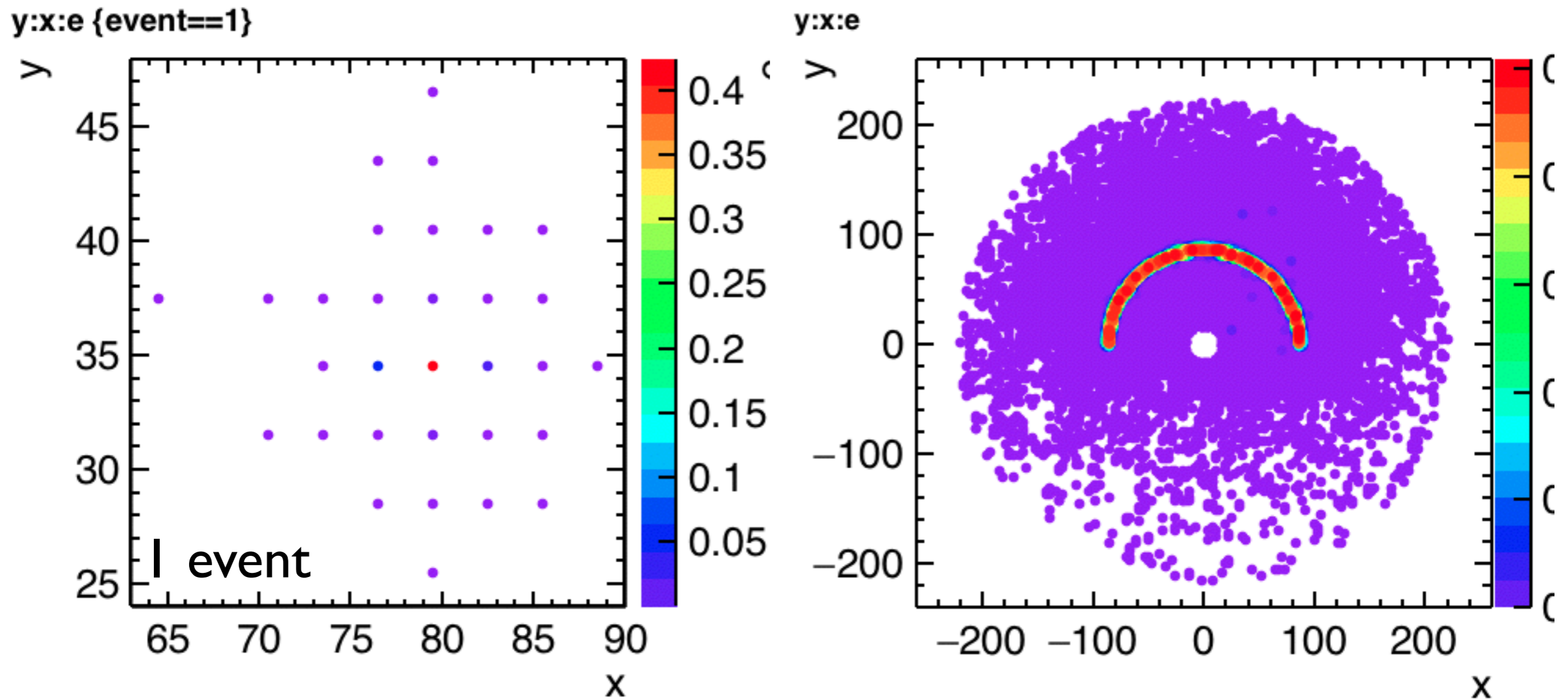
GitHub (EIC): CaloTower Branch

<https://github.com/EIC-Detector/analysis-calorimeter>

The screenshot shows the GitHub repository page for `EIC-Detector / analysis-calorimeter`. The repository has 4 watchers and 0 stars. The current branch is `CaloTower`, which is 22 commits ahead and 1 commit behind the master branch. A commit by `nfeege` is highlighted, titled "Remove call to histogram output functions after these functions have ...", with the latest commit hash `8b24718` from 4 days ago. Below this, a file named `Fun4All_G4_Calorimeter_ZeroField.C` is listed, also with the same commit message and date. A green box highlights the branch selector, and an arrow points from the text below to the file name.

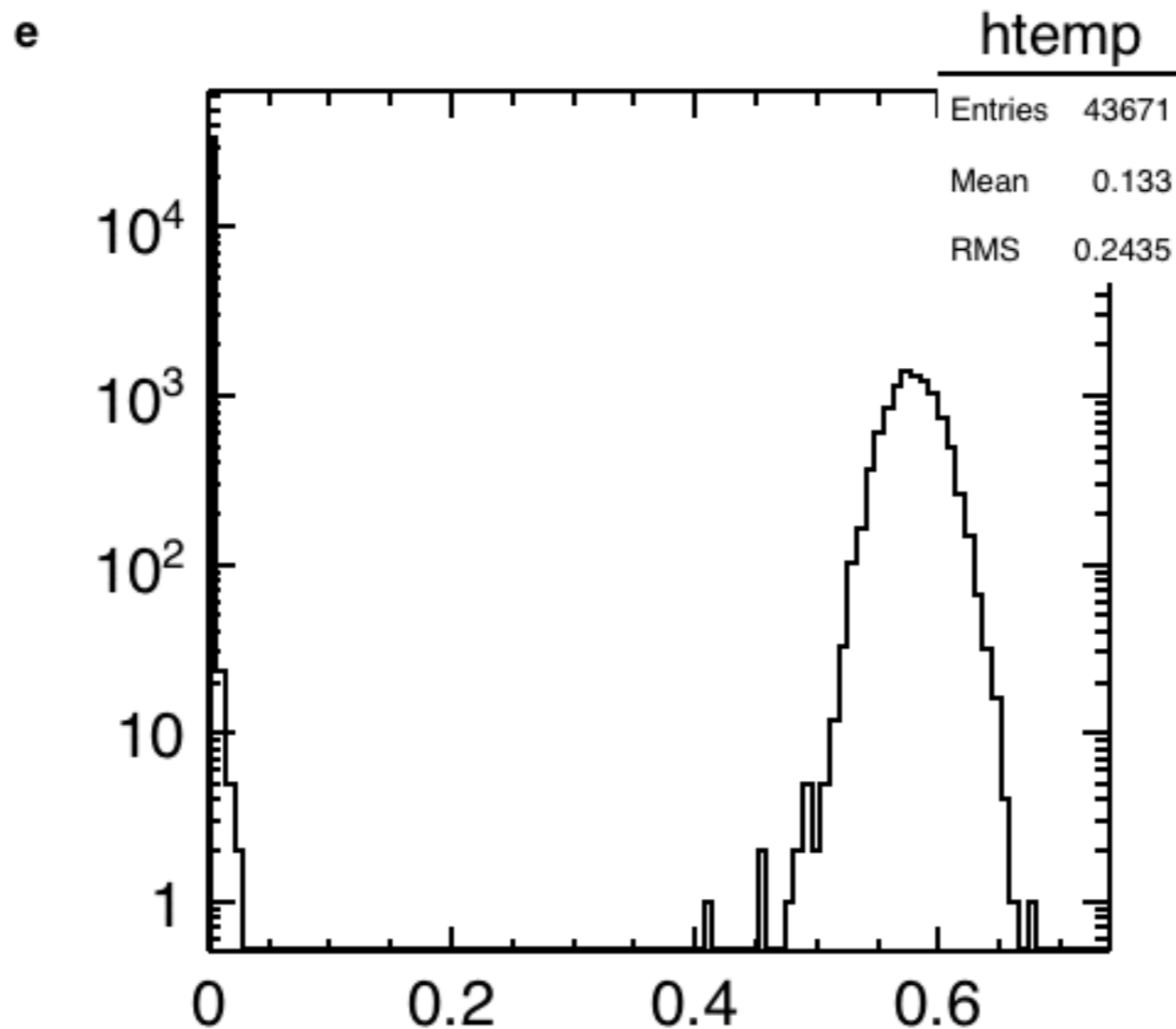
Creates single particle event (ParticleGun) and runs towering and clustering for EEMC, FEMC, and FHCL. Create simple output (ROOT ntuple) for all calorimeters. Switch calorimeters on/off with boolean in macro.

Very quick tower sanity check Forward-EMCal (FEMC)



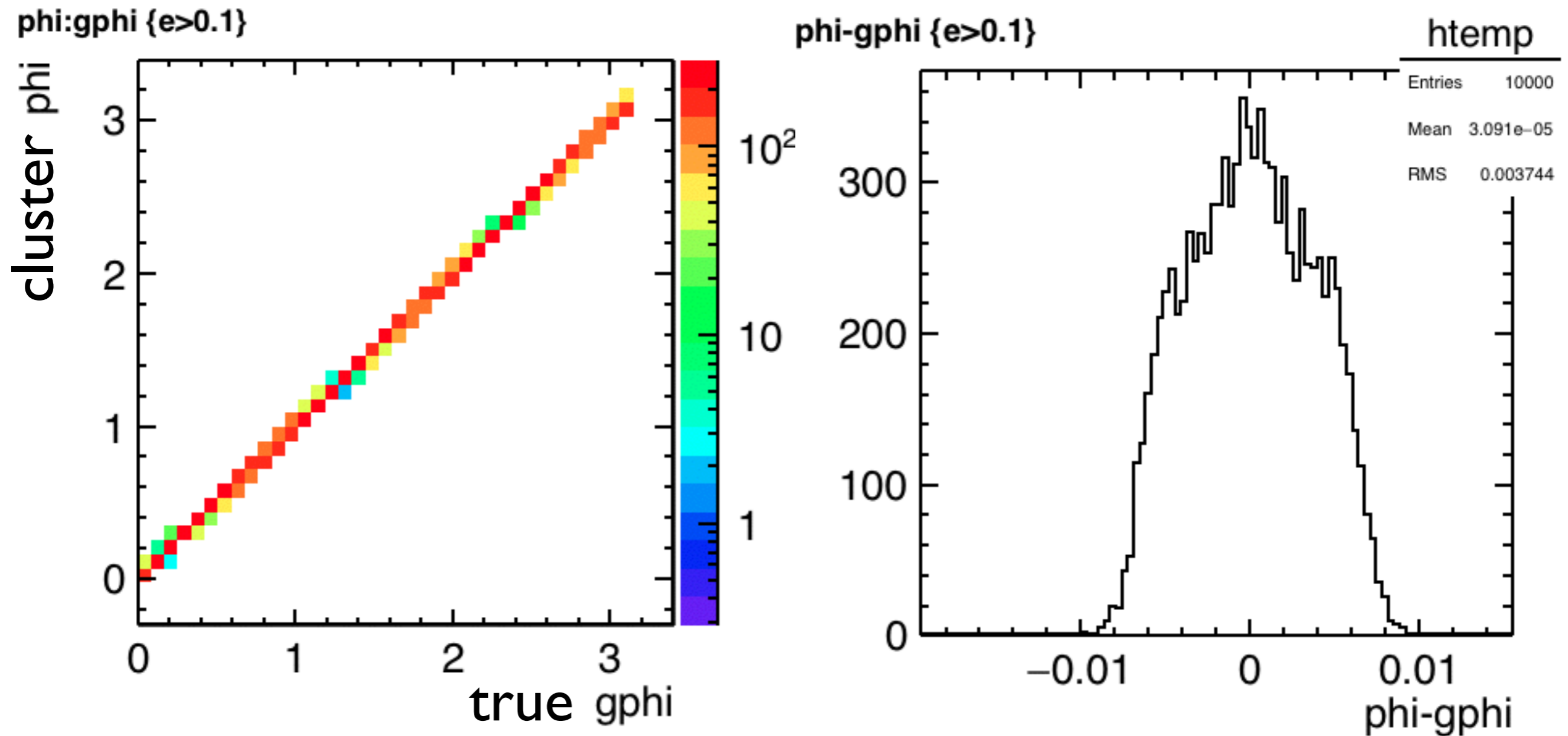
10,000 electrons, 10 GeV, $\eta = 2$, $\phi = 0 \dots \pi$

Very quick cluster sanity check: Energy in Forward-EMCal (FEMC)



10,000 electrons, 10 GeV, eta = 2, phi = 0 ... π

Very quick cluster sanity check: Phi in Forward-EMCal (FEMC)

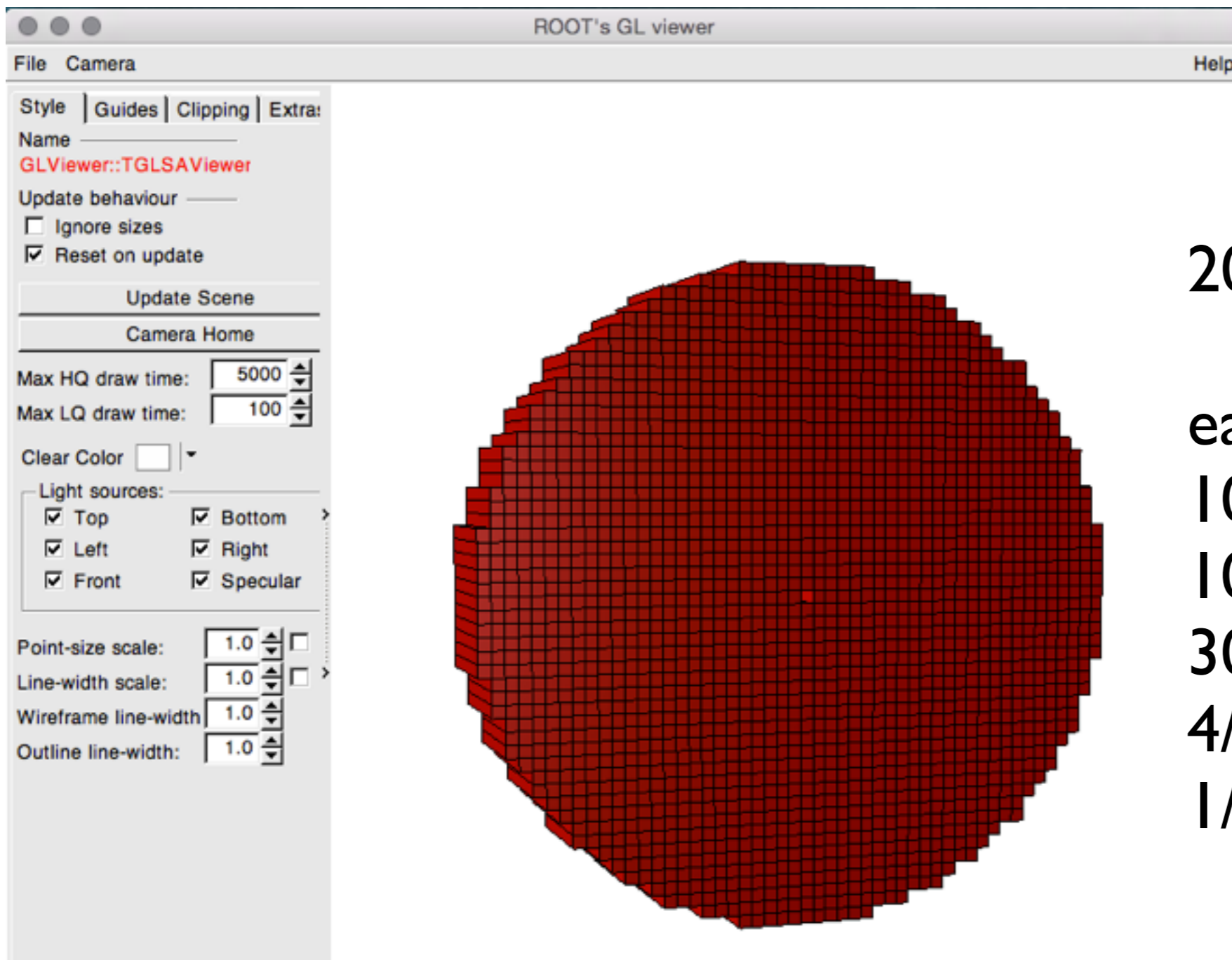


10,000 electrons, 10 GeV, eta = 2, phi = 0 ... π cluster - true

- ◆ CaloCluster objects are ready for test use
- ◆ Next steps:
 - ◆ Track / cluster matching
 - ◆ Performance plots clustering and calorimeters
 - ◆ More detailed studies using calorimeter

Additional Slides

PHG4ForwardHcal

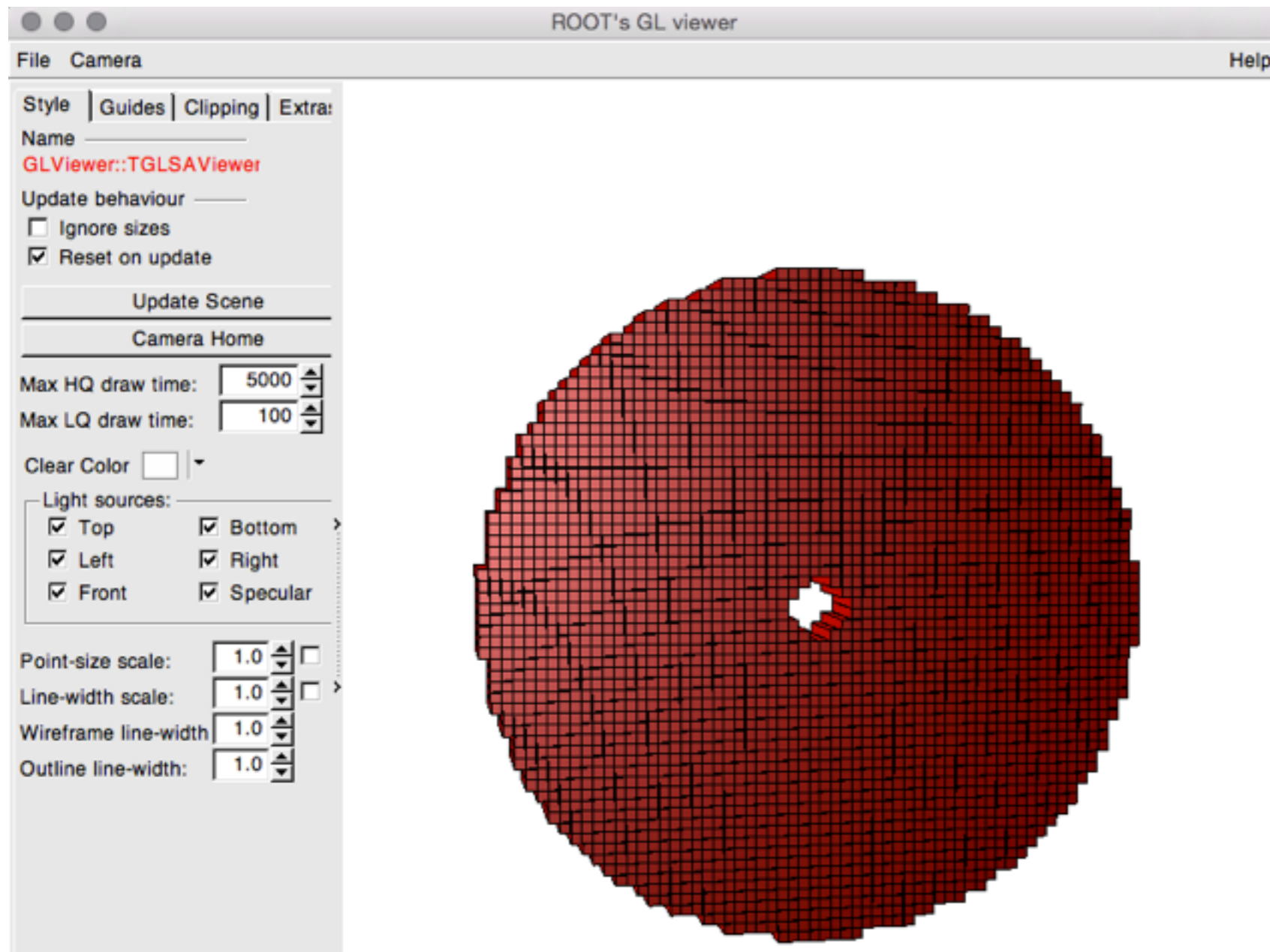


2046 Tower

each tower:
10x10 cm² sampling
100 cm long
30 layers
4/5 iron
1/5 scintillator

https://github.com/ELC-Detector/analysis-calorimeter/mapping/root_tgeo

PHG4CrystalCalorimeter



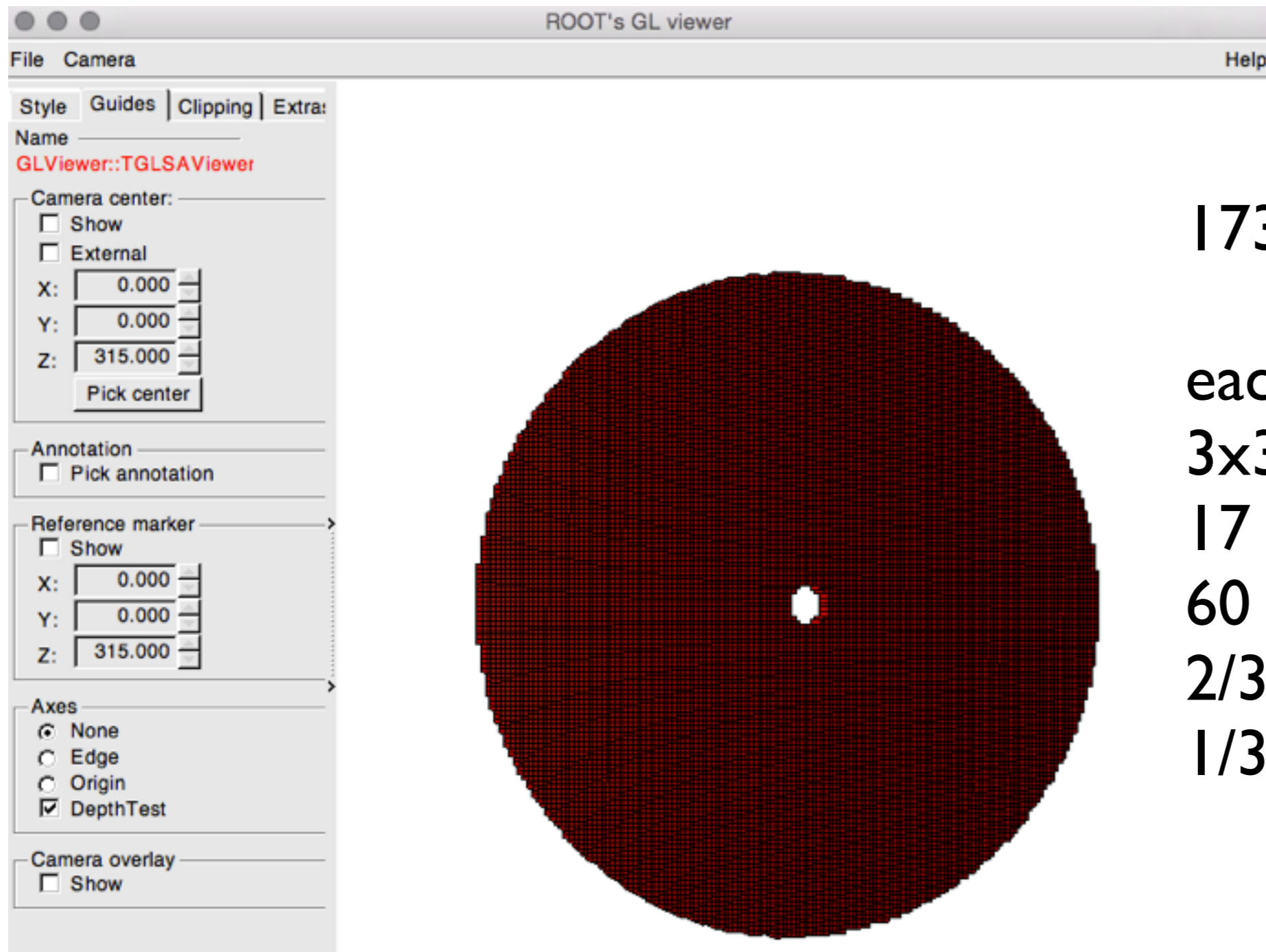
2962 Tower

each tower:
2x2 cm² PbWO₄ crystal
18 cm long
air gap
Carbon fiber frame
non-projective

(Projective version is a separate class)

https://github.com/ELC-Detector/analysis-calorimeter/mapping/root_tgeo

PHG4ForwardEcal



17350 Tower

each tower:
3x3 cm² sampling
17 cm long
60 layers
2/3 lead
1/3 scintillator

https://github.com/ELC-Detector/analysis-calorimeter/mapping/root_tgeo